Title:
2016 New York Sweet Corn Pheromone Trap Network (SCPTN)

Project leader(s):
Marion Zuefle New York State Integrated Pest Management Program

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Cooperator(s):
Adam Abers, Kennedy; Brian Boerman, ACS; Bill Brennan, Avoca; Dick Davin, Avon; George Krul, Oswego; Jeff Kubecka, Kirkville; Keith Slocum, Our Green Acres; Allie Strub, Williamson; Don Sweet, Crop Advantage; Linda Underwood, Preble; Jen Wilcox, independent consultant; Mike Hunter, CCE Jefferson Co.; Abby Seaman, NYS IPM; John Gibbons; Darcy Telenko; Robert Hadad, Christy Hoepting, and Julie Kikkert, Cornell Vegetable Program; Chuck Bornt, Amy Ivy, Laura McDermott, Anne Mills, Teresa Rusinek, Crystal Stewart, Maire Ulrich, Eastern New York Commercial Horticulture Program

Abstract:
For 22 years, the Sweet Corn Pheromone Trap Network has been monitoring the flight of three important insect pests of sweet corn, European corn borer, corn earworm, fall armyworm, and more recently, 2010, Western bean cutworm. These insects cause damage to sweet corn ears in their larval stage. These pests are moths in their adult stage and can be monitored using traps baited with pheromone lures specific for each species. Traps are placed near sweet corn fields to monitor moth flights. The weekly trap catch information allows growers, consultants, Cooperative Extension and vegetable processor field staff to track the flights and make informed decisions about when sweet corn fields need to be scouted or treated with an insecticide. This project was funded in part by in-kind contributions from growers and consultants who host and check traps.

Background and justification:
Sweet corn for the fresh and processing markets is an important crop throughout NY. In 2015 fresh market sweet corn was planted on 18,100 acres in New York with a value of 31.4 million dollars. Four major pests of sweet corn, European corn borer (ECB-E and ECB-Z), corn earworm (CEW), fall armyworm (FAW) and Western bean cutworm (WBC) can be monitored in their adult stage using pheromone traps. Pest management is an especially important aspect of fresh market sweet corn production because the unhusked ear is marketed, and buyers are frequently very sensitive to insect damage or the presence of larvae in the ear. Harvest quality requirements are different for processing corn, which usually receives fewer insecticide applications than fresh market corn. Integrated pest management practices are widely used on both crops to determine the need for insecticide applications. Pheromone trap catches provide valuable information to growers, consultants, and processor field staff making pest management decisions. Pheromone trap catches help growers and consultants decide when to start scouting fields for egg masses and larvae, reinforce what scouts are finding, help growers choose the best spray materials for the pest complex that's present, and alert the industry to the arrival of the migratory

pests, CEW and FAW.

Pheromone Trap catches from 24 sites in western NY were an integral part of the weekly pest update newsletter, *VegEdge*, sent by the Cornell Vegetable Program to subscribers in twelve counties. An additional 14 sites in Eastern NY were also monitored weekly. Trap catches for these locations were made available, through *Veg Update*, to subscribers of the 17 county Eastern NY Commercial Horticulture Program (ENYCHP). The Trap catches were also posted weekly to the sweet corn pheromone trap network blog, linked to the NYS IPM Program website, the Network for Environment and Weather Applications website, and posted to a regional website (PestWatch) that includes trap catches from several northeastern states, making the information available to a large number of growers and extension personnel.

Objectives:

1. Establish and maintain a network of pheromone traps for sweet corn pests in NY.
2. Provide regional trapping information and recommendations to extension field staff and consultants working with sweet corn growers.
3. Provide regional trapping information to growers, along with scouting and threshold recommendations.

Procedures:

1. Sets of one each of ECB-E, ECB-Z, CEW, FAW, and WBC traps were placed at each of 38 trapping locations, 24 sites in western NY and 14 sites in eastern NY (Figure 1). Scentry Heliothis net traps were used to trap ECB and CEW. The BCS/Agrisense Unitrap was used for FAW and WBC. Lures from Trece Inc. were used for both races of ECB. Lures from Scentry Inc. were used for CEW, FAW and WBC. All lures were replaced every two weeks.
   ECB, CEW, and FAW traps were set up in late-May at fresh market locations, and as processing fields approached tassel emergence in other locations. WBC traps were set up in early to mid-June.
   Traps were placed at least 40 meters apart in grassy areas near sweet corn fields, avoiding areas near hedgerows where air circulation is poor. Heliothis traps were mounted on posts such that the bottom of the trap is ~6" above the grassy canopy. Unitraps were hung from short stakes to which angle brackets had been attached and were placed either in the field or at the edge of the field. Whenever possible, traps were moved to new fields as the previous fields matured (silks became dry) and became less attractive to moths.
2. In Western NY, cooperators checked traps weekly on Monday or Tuesday and sent trap catch numbers to Marion Zuefle via phone or email. Weekly catches for each location were collated and posted, along with interpretation and scouting and thresholds recommendations for fresh market sweet corn, on the sweetcorn.nysipm.cornell.edu website. This year, trap catch numbers from 14 Eastern NY sites were also included in the weekly blog post.
3. Information posted on the website was used directly by subscribing growers, incorporated into crop and pest updates distributed weekly by regional extension

programs, or provided to growers via direct contact with collaborating consultants. All catches were also posted on the PestWatch website.

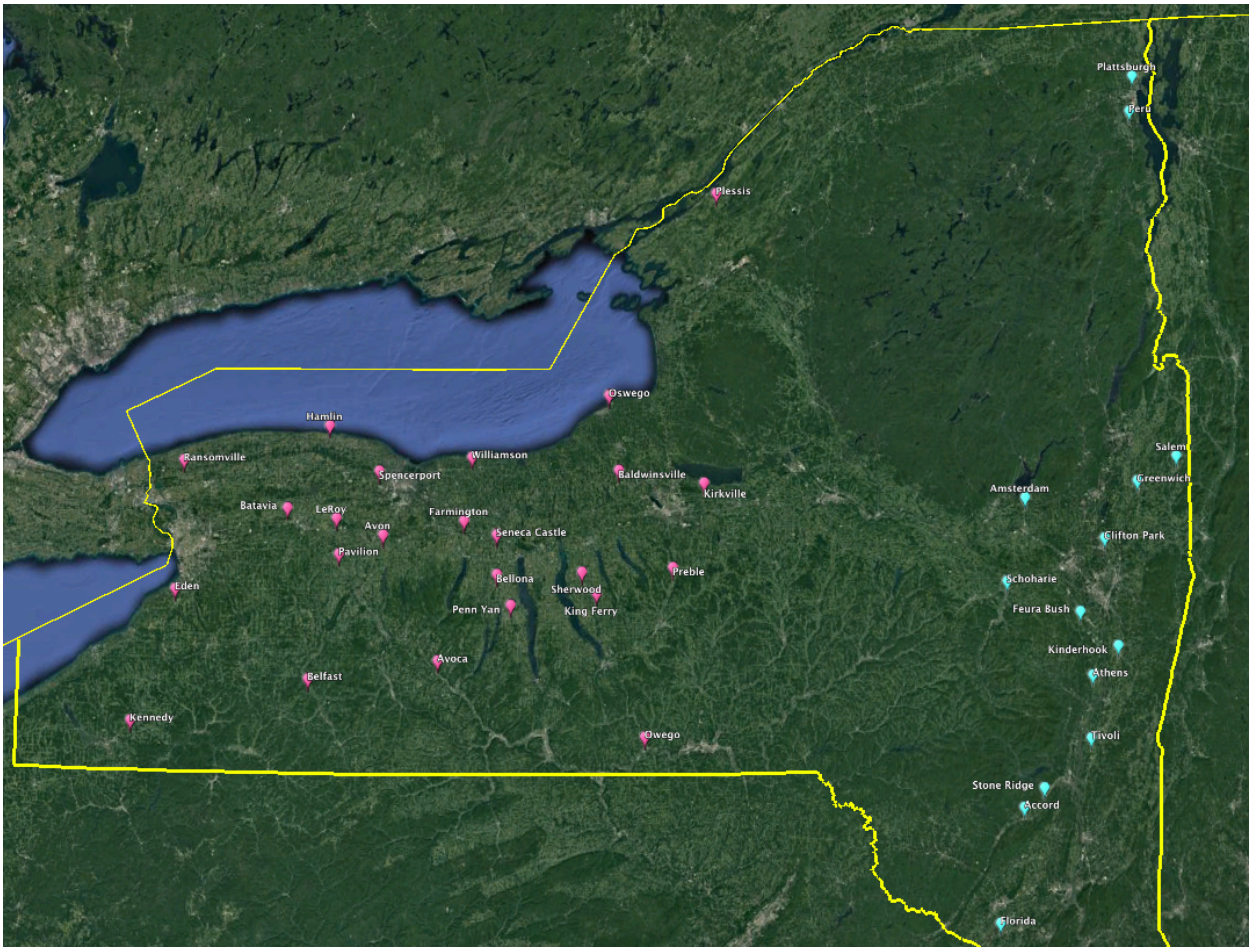

Figure 1. Map showing the 24 trap locations in western NY (pink) and the 14 trap locations in eastern NY (blue).

Results and discussion:

Results for the 14 sites in Eastern NY and the 24 sites in western NY are given here. European corn borer numbers remained low throughout most of the season for both eastern (Figure 2) and western NY (Figure 3). This was the first year that data from eastern NY was included in this report so comparisons to previous years cannot be made. For western NY, the second-generation flight of ECB-E in early August was much greater in 2015 as compared to this year, 2016 (Figures 3 and 4). Both of these moths continue to declining overall when looking at the 23-year trend (Figure 5). This decline has been attributed in part to the increase use of Bt field corn.

Corn earworm trap catch numbers for western NY in 2016 (Figure 3) were much greater than in 2015 (Figure 4). The peak in 2016 came about two weeks later and was more than twice the peak of 2015. The 19-year trend shows a slight increase in CEW numbers as

compared to the previous year but remains below the 19-year average (Figure 6). In eastern NY CEW flight began at the same time as western NY but peaked at an average of 15 moths per week (Figure 2) as compared to western NY that peaked at an average of 22 moths per week (Figure 3).
There were several reports of CEW damage in Bt corn both in 2015 and 2016. According to research conducted by Galen Dively from the University of Maryland, CEW has probably developed resistance to the Cry1 Bt toxins present in many sweet corn varieties. Newer varieties from Syngenta contain a combination of Cry 1Ab and a new toxin, Vip3A. This new toxin is highly effective against CEW as well as FAW and WBC.

Fall armyworm peak trap catch averaged 78 moths during the 3rd week of September 2016 (Figure 3) in western NY. This was higher than the average of 2015 (Figure 4), however the overall moths caught for the year was lower than the previous year (Figure 6). For eastern NY, FAW peaked the 2nd week of September and averaged 30 moths per site.

In 2010 we began monitoring the flight of Western bean cutworm in NY. This was the first year where we saw a slight decrease in the average moths caught per year (Figure 6). WBC in both 2016 (Figure 3) and 2015 (Figure 4) peaked at an average of 35 moths per trap site, but the peak flight in 2015 lasted two weeks longer than 2016. In eastern NY, WBC peaked during the first week in August, similar to western NY, but the peak average trap catch was 16 moths, half of that for eastern NY.

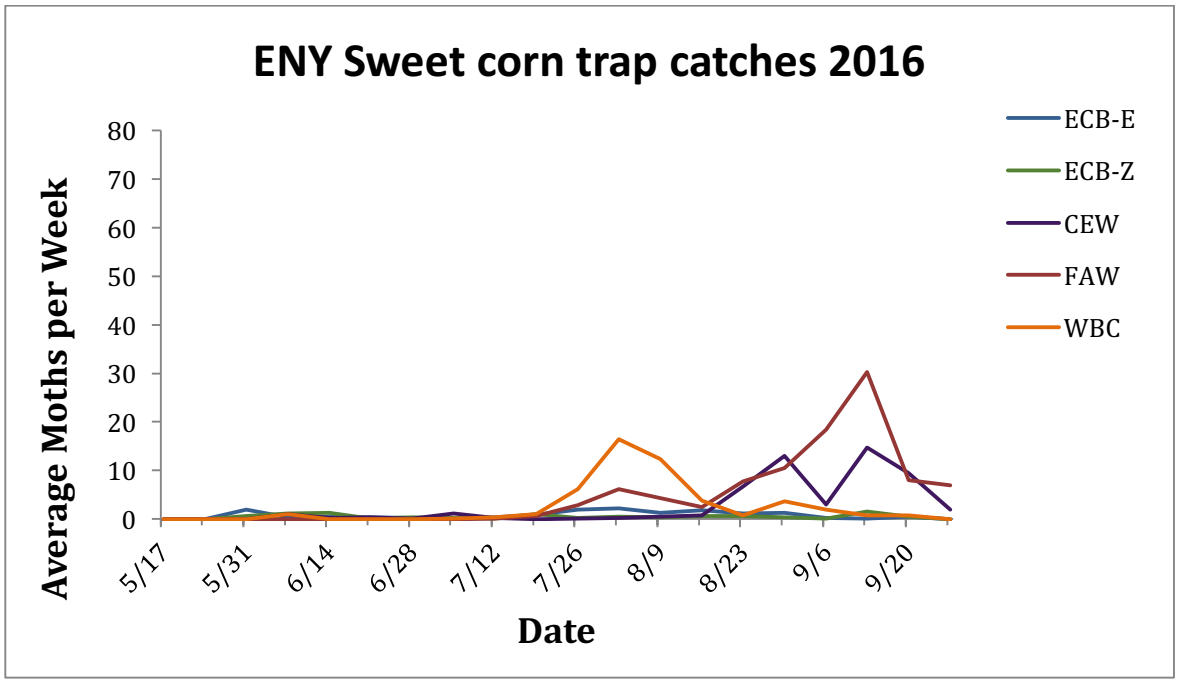

Figure 2. Average number of moths caught per week for the 14 Eastern NY sites in 2016.

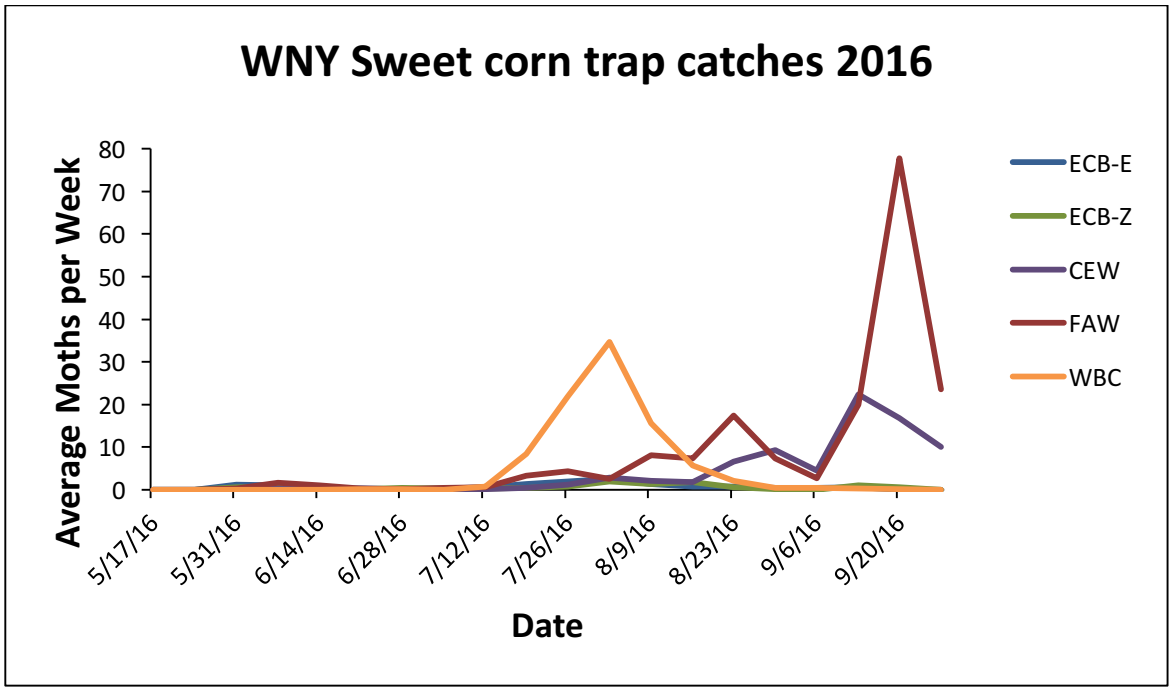

Figure 3. Average number of moths caught per week for 24 Western NY sites in 2016.

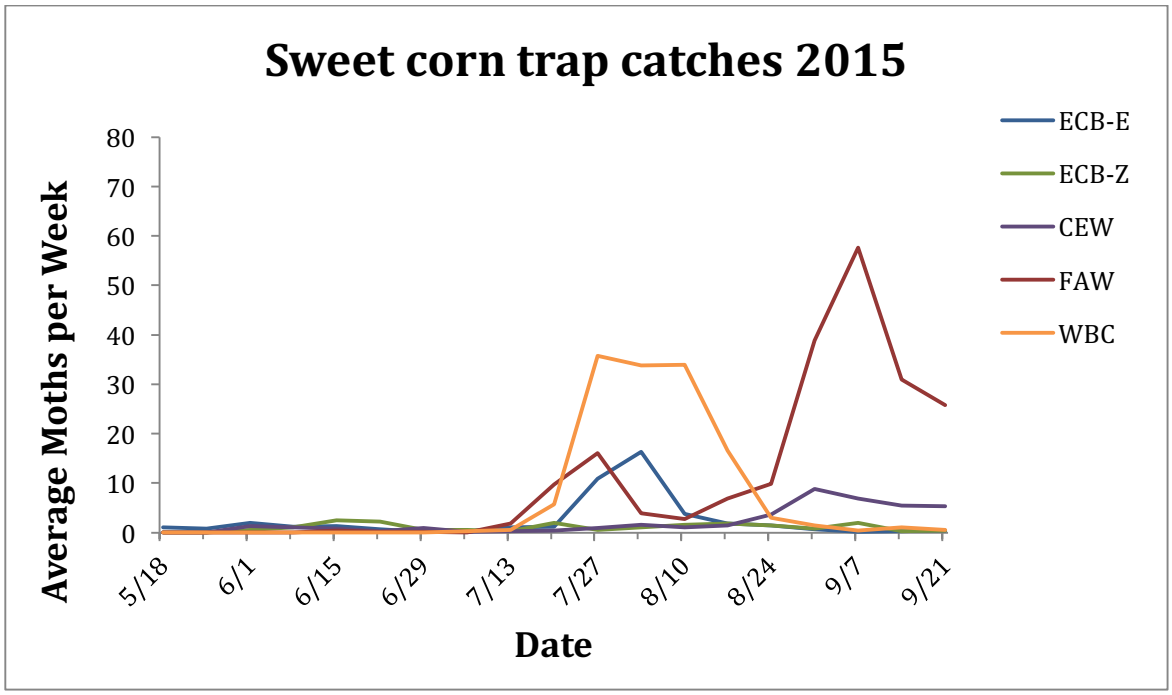

Figure 4. Average number of moths caught per week for 25 Western NY sites in 2015.

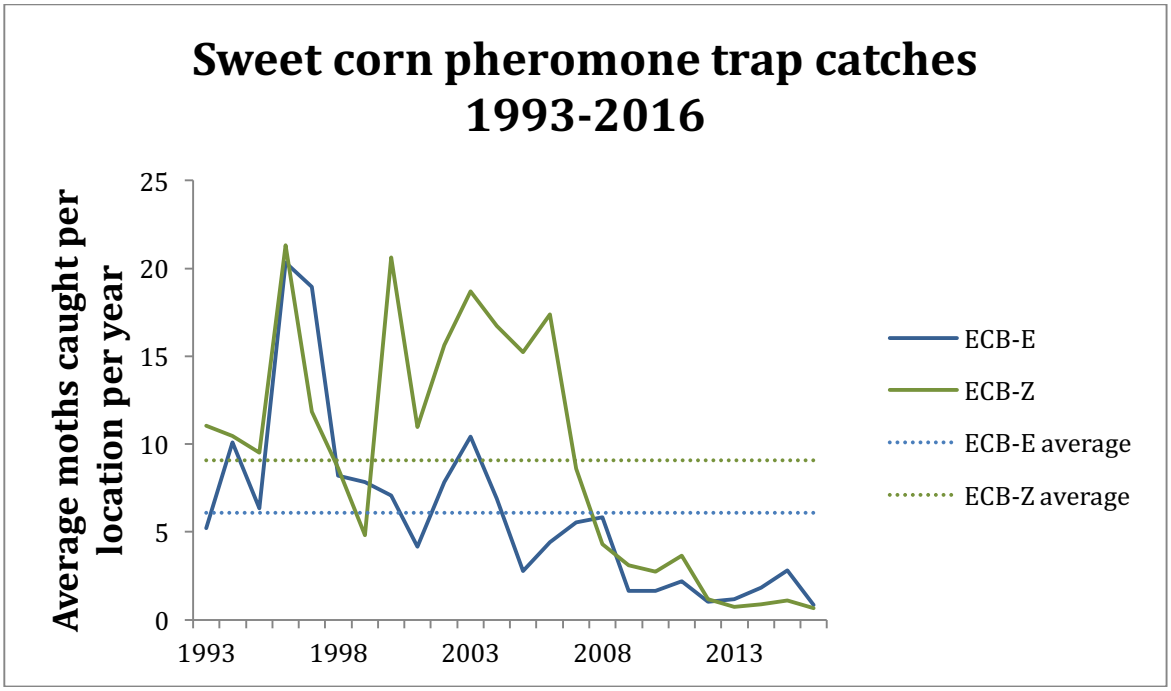

Figure 5. Average number of European corn borer, both E and Z race, moths caught per trapping location per year from 1993-2016 (Western NY only).

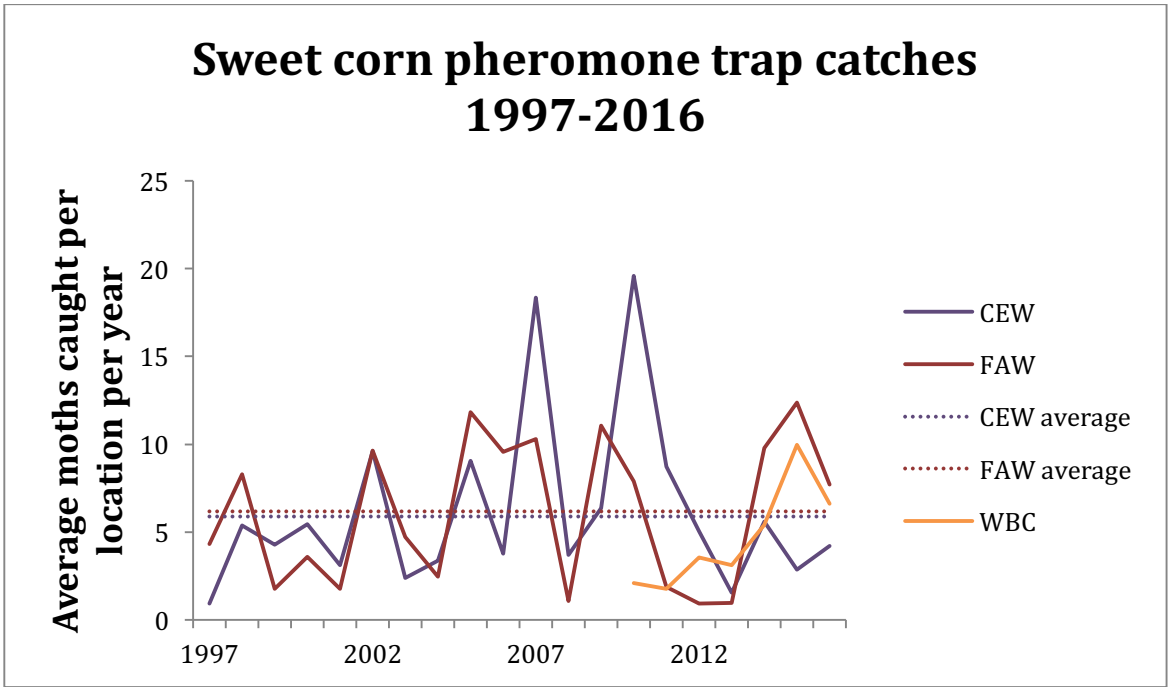

Figure 6. Average number of corn earworm (CEW), fall armyworm (FAW) and western bean cutworm (WBC) moths caught per trapping location per year from 1997-2016 (Western NY only).

Project location(s):
Avoca, Steuben Co.; Avon, Livingston Co.; Baldwinsville, Onondaga Co.; Batavia, Genesee Co.; Belfast, Allegany Co.; Bellona, Yates Co.; Eden, Erie Co.; Farmington, Ontario Co.; Hamlin, Monroe Co.; Kennedy, Chautauqua Co.; King Ferry, Cayuga Co.; Kirkville, Madison Co.; LeRoy, Genesee Co.; Ransomville, Niagara Co.; Oswego, Oswego Co.; Owego, Tioga Co.; Pavilion, Genesee Co.; Penn Yan, Yates Co.; Plessis, Jefferson Co.; Preble, Cortland Co.; Seneca Castle, Ontario Co.; Sherwood, Cayuga Co.; Spencerport, Monroe Co.; and Williamson, Wayne Co.
Accord, Ulster Co.; Amsterdam, Fulton Co.; Athens, Greene Co.; Clifton Park, Saratoga Co.; Feura Bush, Albany Co.; Florida, Orange Co.; Greenwich, Washington Co.; Kinderhook, Columbia Co.; Peru, Clinton Co.; Plattsburgh, Clinton Co.; Salem, Washington Co.; Schoharie, Schoharie Co.; Stone Ridge, Ulster Co.; and Tivoli, Dutchess Co.

Samples of resources developed:
Weekly blog posts from 5/31/16 to 9/27/16; totaling 18 posts were posted to the Sweet Corn Pheromone Trap Network Report blog found at:
http://sweetcorn.nysipm.cornell.edu/
There are 92 subscribers to the blog and within the last year this blog has received 1,681 page views by 815 unique visitors over the last year.
The weekly blog posts are also included in the *VegEdge* newsletter which has 435 enrollees. Trap counts for eastern NY are presented in the *Weekly Veg update* which has 550 enrollees.